

SUB A1> 1. A process for forming a silver coating on a surface of a metal which is less electropositive than silver comprising contacting the metal surface with an aqueous displacement plating composition comprising silver ions and a multidentate complexing agent in solution in an aqueous vehicle and having a pH of from 2 to 12, to form a coating of silver on the metal surface.

2. A process according to claim 1 in which the process is for forming a protective coating on a substrate in which the metal surface comprises conductive metal pads and/or through-holes of a bare board, and in which the substrate includes non-metallic areas which remain uncoated in the process, preferably solder-mask coated areas.

3. A process according to claim 1 or claim 2 in which the metal surface comprises copper.

4. A process according to claim 1 in which the complexing agent is present in a higher molar amount than the silver ions, preferably at least twice the molar amount.

5. A process according to claim 1 in which the silver ions are present in the displacement plating composition at a concentration of from 0.06 to 32 g/l, preferably from 0.1 to 25 g/l, most preferably from 0.5 to 15 g/l.

SUB A1) 6. A process according to claim 1 in which the complexing agent is present in the composition in an amount of from 0.1 to 250 g/l, preferably from 10 to 100 g/l.

7. A process according to claim 1 in which the complexing agent is selected from ethylenediamine tetra-acetic acid, diethylenetriamine penta-acetic acid and N,N,N',N'-tetrakis(2-hydroxy propyl)ethylene diamine.

8. A process according to claim 1 in which the displacement coating composition comprises surfactant, wetting agent, stabilizer, grain refiner and/or tarnish inhibitor.

9. A process according to claim 8 in which surfactant is incorporated in the displacement plating composition at a concentration of from 1 to 15 g/l.

10. A process according to claim 1 in which the plating composition is free of reducing agent capable of reducing the silver ions to silver metal and free of halide ions.

11. A process according to claim 1 in which contacting the metal surface with the displacement coating composition is by spraying or dip-coating in an immersion bath and in which excess composition is reused in the process.

SUB A1) 12. A process according to claim 1 in which the metal surface is contacted with the immersion coating composition for from 10 seconds to 10 minutes, preferably at a temperature of from 10 to 60°C, most preferably at a temperature of from 15 to 50°C.

13. A process according to claim 1 in which the silver coating is less than 0.5  $\mu\text{m}$  thick.

14. A process according to claim 1 in which prior to the immersion plating step, the metal surface is cleaned by contacting with an acidic cleaning solution in an acid cleaning step, preferably undergoing a post-rinse step prior to the immersion plating step.

15. A process according to claim 1, in which prior to contacting the metal surface with the immersion plating composition, the metal surface undergoes a micro-etching step and preferably between the micro-etching step and the immersion plating step, there is an additional acid rinse step.

16. A process according to claim 1 in which the silver coated metal surface is subsequently rinsed and, optionally, dried.

SUBA1) 17. A process according to claim 1 in which a conductor component is subsequently soldered direct to the silver coating.

18. A multi-step process for producing a bare printed circuit board including the step of:

i) providing by a subtractive or additive process a substrate having exposed metal conductor traces and pads and/or through-holes said metal being less electropositive than silver,

ii) applying a mask to cover at least the said traces and leaving at least some of the pads and/or through-holes exposed, the mask being of an insulating composition,

iii) forming a silver coating on the exposed pads and/or through-holes by contacting the metal surface with an aqueous displacement plating composition comprising silver ions and a multidentate complexing agent in solution in an aqueous vehicle and having a pH of from 2 to 12, to form a coating of silver on the metal surface.

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